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SPECIFICATION:

The invention was constructed out of strong material to withstand any normal wear and tear in the use of the invention.

The electronic parts were purchased and then addressed in a manner to create the invention to make it function.

The lighting design and schematic are wired in such a manner as to "flash the lights" emulating the same time it takes for the bottle cap to reach the end of the bottle cap tunnel(Several light patterns).

There are several different lighting patterns that are introduced to make the invention more interesting. As follows:

There is push button switch in which the user can change the mode of the lighting pattern.

The first being a standard pattern following the exact time each obstacle rib is struck be the bottle cap, that particular light will flash and then go off . The last light flashes when the bottle cap strikes the last obstacle rib then that light goes off. So, the lights emulate the same pattern as the bottle cap.

A second being that the lighting pattern starts at the top and flashes two rows at a time emulating the same pattern as the bottle cap.

I have created other lighting patterns as follows:

A third pattern being that the first and last lights positioned on the bottle cap tunnel start flashing in opposite directions meeting in the middle then traveling to the top and bottom of the bottle cap tunnel. The lights then go off when they reach the original starting point.

Other lighting patterns have been addressed into the invention. In, review, I think entering any more lighting patterns for explanation is fruitless because in my opinion, the reader gets the idea that many different lighting patterns can be introduced into the invention without mentioning all of them.

The lighting patterns can be programmed to do any pattern one wishes. The number of lighting patterns is so many that it is senseless to try to mention them all.

I have measured many bottle caps from different distributors and all of them are the same.

This is probably do with the size of the top of the bottle fitting the mouth of a person consuming the product.

So, the inside obstacle ribs of the bottle cap tunnel are a tiny bit further way from each other than the diameter of the bottle cap. Thus, creating a very small space between the bottle cap and the obstacle ribs that the bottle cap has to pass by.

The fact that there is a very small space between the bottle cap and the obstacle ribs, the bottle cap is forced to strike each obstacle rib on the way down the bottle cap tunnel. This symmetrical design causes the bottle cap to spiral and ricochet back and forth as the bottle cap travels down the bottle cap tunnel.

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TITLE OF THE INVENTION:

The invention is as follows:

The invention is a sensor lighted bottle cap tunnel.

This application claims priority of application serial number 10/279497 filing date of 10/24/2002.

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CROSS REFERENCE:

My other invention's application number is 10/279497 applied for 10/24/02.

The new invention has some changes to the first application for the utility patent.

1) The first had sound activated lighting only which limited the lighting display. The new additional lighting now has the option to use activated lights that are not sound activated. The new lighting also allows the lighting to be activated by different types of sensors. Thus, allowing a much broader margin for different lighting displays to be addressed to the invention.

2) The second part of the added changes is that the new invention has a new concept for the bottle cap tunnel's construction. The first invention had a free standing obstacle bar that slid in and out of the bottle cap tunnel's frame. The new bottle cap tunnel has obstacle ribs that are actually a part of the inside walls of the frame. The measurements for the obstacle ribs are the same as the obstacle bars(first invention) and also have the same positioning in both designs. The reason for the obstacle ribs is to make the invention easy to manufacture. Both the obstacle bars (first invention) and the obstacle ribs (second invention) create the same spiral and ricochet of the bottle cap as the bottle cap travels down the bottle cap tunnel.

3) The third part of the added changes is that the new invention's frame is different in the following aspect: The first invention had a bottom to the bottle cap tunnel. The second invention has no bottom to the bottle cap tunnel. Thus, allowing the bottle cap to travel down the bottle cap tunnel into a trash box. The trash box can then be dumped into any garbage can. This allows the consumer to enjoy the full benefit of watching the bottle cap travel the same distance every time. The reason is the bottle cap tunnel never gets filled up with bottle caps because it has no bottom.

I am cross referencing this information as stated. I am seeking patent protection on both applications.

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BACKGROUND OF THE INVENTION:

My invention started out around the beginning of July 2002. I have a patent applied for with the original invention with the United States Patent and Trademark office. (# 10/279497)

I have made some changes to the original invention. The bottle cap tunnel that had a free standing obstacle bar no longer exists in the second generation model. This particular invention has obstacle ribs that are part of the inside walls of the tunnel. The obstacle ribs were thought of to replace the obstacle bar to make the invention easier to mass produce.

This thought came to me around the beginning of January of 2003.

Also the original invention used sound activated lighting which also has some new changes.

This part of the invention came to me around March of 2003. As follows:

I now use sensor lighting that is activated by an infrared light emitting diode.

I also thought of using a microchip that could be programmed to create the lighting design.

This microchip took some time to program to do the function in which I intended.

A Compact Disk with the explanation are part of the invention that were thought of in theory.

After proving the theory that the unit did function in the manner that I intended it to,

is when I decided to apply for my continuation of the original patent application.

The schematic and explanation included in the package explains how the invention works.

The mechanical specifications are the same as the original invention. As follows:

Basically , the theory of the bottle cap tunnel is the same as the original unit that I constructed.

It works the same as the original model only the second generation will be much easier to mass produce with the obstacle ribs replacing the free standing obstacle bar.

The application of the lighting design is a new idea introduced to the original invention. As follows:

The lighting design that I use in the second generation model is much more appealing and also uses off the shelf parts. But , the thought of how to make the electronic parts function used in my invention came to me around March of the year 2003. I addressed the way that all of these electronic parts function in the manner intended for this invention.

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BRIEF SUMMARY OF THE INVENTION:

The bottle cap tunnel mounts wherever easily.

The bottle cap tunnel forces the bottle cap to go into a trash box that holds many bottle caps.

The bottle cap tunnel has novelty in that it creates a fun atmosphere when activated by a bottle cap.

The invention has been tested over and over again and the invention always works.

Any one who chooses to utilize the invention has fun watching the bottle cap descend down the bottle cap tunnel with the lights flashing at the same time the bottle cap strikes each obstacle rib.

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BRIEF DESCRIPTION OF THE DRAWINGS:

The invention is a bottle cap tunnel that has obstacle ribs positioned on the four inside walls of the bottle cap tunnel. The obstacle ribs a positioned symmetrically to force the bottle cap to spiral and ricochet down the bottle cap tunnel.

The bottle cap tunnel has a circuit board behind the back wall that has electronic components positioned with a sensor positioned at the top of the bottle cap tunnel. The sensor is activated by the bottle cap breaking the beam of an infrared beam. That sensor then sends a signal to a micro controller. The micro controller then sends a signal to lights that are activated to flash. The flash of the lights emulates the same time the bottle cap takes to travel down the bottle cap tunnel. The obstacle ribs of the back wall of the bottle cap tunnel have lights on the side of each obstacle rib. As the bottle cap descends down the bottle cap tunnel the lights flash at the same speed. The bottle cap tunnel has no bottom. The bottle cap is forced to go into a trash box. Several light patterns have been addressed to the invention through the micro-controller. The first being the standard: As the bottle cap travels down the bottle cap tunnel the lights flash at each obstacle rib (positioned on each side of each obstacle rib). Each obstacle rib set of lights go on then off in the same time it takes the bottle cap to travel past that particular obstacle rib. (The time is approximately is .117 seconds / one tenth and seventeen hundred seconds).

The front and sides of the bottle cap tunnel have strong clear material that allows the bottle cap to be visible as the bottle cap travels down the bottle cap tunnel.

The bottle cap tunnel(funnel part) has a hole where it mounts to any wall or secure surface with a screw. The bottle cap tunnel is thirty three inches in height. The bottle cap tunnel is two and one/quarter inches in width and depth.

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DETAILED DESCRIPTION OF THE DRAWINGS OF THE BOTTLE CAP TUNNEL:

The top part(funnel part) measures three inches in height The funnel part measures three and one/ half inches in depth. The (funnel part) measures five inches in width.

Where the bottle cap tunnel(neck of bottle cap tunnel) meets the funnel part the bottle cap tunnel is thirty inches in height. The bottle cap tunnel is two and one half inches in width and depth.

The bottle cap tunnel has no bottom. The bottle cap is forced to go into a trash box.

The measurements are described on pages of drawings.

1) The front side of the inside wall of the bottle cap tunnel has one eight inch obstacle ribs starting at the very top of the bottle cap tunnel(where neck starts). These obstacle ribs are positioned center to center down the bottle cap tunnel's front inside wall every one and one/half inches. This positioning continues all the way down the front inside wall. The count on the front obstacle ribs is twenty one.

2) The back side of the inside wall of the bottle cap tunnel has one eight inch obstacle ribs starting one half inch down from the top of the bottle cap tunnel(where neck starts). These obstacle ribs are positioned center to center down the bottle cap tunnel's back inside wall one and one/half inches. The count on the back obstacle ribs is twenty.

3) The inside wall of both side walls of the bottle cap tunnel both have one eight inch obstacle ribs. The side wall obstacle ribs are positioned center to center down the bottle cap tunnel center to center every one inch. The first obstacle rib of the inside of the side walls are positioned one quarter inch down from the top of the bottle cap tunnel(where neck starts). Both side inside walls of the bottle cap tunnel are a mirror image of each other.

The count on the side obstacle ribs is thirty one.

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DETAILED DESCRIPTION OF THE SPACING BETWEEN OBSTACLE RIBS

THE EXPLANATION OF THE DRAWINGS ARE ON DRAWING PAGES

1) The inside wall measurement from the front inside wall to the back inside wall is one and seven/sixteenth inches. Thus, both inside front and back walls have obstacle ribs that are positioned to force the bottle cap to ricochet. So, the measurement from the front inside wall obstacle rib to the back inside wall obstacle rib is one and three/sixteenths inches.

2) The inside wall measurement from the inside wall of the side wall to the other inside wall of the side wall is one and seven/sixteenths inches. Thus, both inside side walls have one /eight inch obstacle ribs that are positioned to force the bottle cap to spiral. So, the measurement from the side obstacle rib to the other side obstacle rib is one and three/sixteenth inches.

NOTE: THE ABOVE MEASUREMENTS CREATE AND OPEN AREA OF ONE AND THREE SIXTEENTHS INCHES. ALL STANDARD BOTTLE CAPS ARE ONE AND ONE EIGHT INCHES IN DIAMETER. THIS OPEN AREA CREATED BY THE MEASUREMENTS FROM ALL FOUR SIDES OF THE OBSTACLE RIBS CREATES A VERY TINY SPACE FOR THE BOTTLE CAP TO PASS BY. THIS TINY SPACE FORCES THE BOTTLE CAP TO STRIKE EACH OBSTACLE RIB AS IT TRAVELS DOWN THE BOTTLE CAP TUNNEL.

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DESCRIPTION OF HOW THE ELECTRONICS FUNCTION IN RELATIONSHIP TO

THE BOTTLE CAP TUNNEL

The light display is an array of lights arranged in twenty rows corresponding to the twenty back wall obstacle ribs of the bottle cap tunnel. The lights flash on and off in sequence starting at the top of the bottle cap tunnel tracking the bottle cap as it falls through the tunnel. A micro controller (MCU) controls the lighting sequence and timing. A sensor is positioned just above the first back obstacle rib. This sensor triggers the start of the lighting display sequence. The bottle cap falls through an infrared beam causing the receiving sensor to send a trigger pulse to the micro controller telling the micro controller to start the lighting sequence. The lighting sequence takes about two and four tenths seconds to complete. Upon completion with no bottle caps in the bottle cap tunnel, a finale display is initiated lasting about one second. A mode switch positioned on the bottle cap tunnel allows the user to change the lighting display sequence.

1) The first style is the standard lighting display. The lighting display travels at the same speed down the bottle cap tunnel. The last light goes off when the bottle cap reaches the end then into a trash box.
2) The second being two rows at a time to create the same pattern as the first style lighting display.
3) The third being that the first and last start going opposite directions meeting in the middle and then going on to the very top and bottom of the bottle cap tunnel. The lights go off when they reach their original starting point.
4) The fourth being that the first goes off, then the third, back to the second, then to the fourth obstacle rib. The pattern goes on until the bottle cap reaches the bottom then the last lights go off.
5) There are other lighting patterns but I feel it is insignificant to mention them all.

NOTE: THE INVENTION COULD BE DONE WITH VARIOUS MEASUREMENTS ON THE BOTTLE CAP TUNNEL AND ALSO USING A DIFFERENT ELECTRONIC DESIGN. I INVENTED THE BOTTLE CAP TUNNEL UNIT USING THESE PARTICULAR MEASUREMENTS AND ELECTRONIC DESIGN TO MAKE THE UNIT EASY TO MANUFACTURE.

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Light Display Electronics

Circuit Description

The light display consists of twenty rows of LEDs (Light Emitting Diodes) placed so as to align with the twenty deflection ribs on the backside of the bottle cap tunnel. The lights turn on and off in a prescribed pattern that is synchronized to the position of the bottle cap as it falls though the tunnel. Five different light sequence patterns are selectable from a push button switch. The light pattern sequence begins when the bottle cap enters the top of the tunnel and upon exiting the bottom of the tunnel, a final short display pattern sequence is initiated.

The bottle cap entry into the top of the tunnel is sensed by a phototransistor and infrared LED (Q1 and D1 in the schematic diagram). The bottle cap momentarily interrupts the infrared light path causing the phototransistor Q1 to send a short pulse to the microcontroller chip. The microcontroller performs the complete control of the light pattern sequences and acts as the central "brain" of the light display system. A program in the microcontroller monitors the sensor input from Q1 and initiates and controls the light pattern sequence when a sensor signal is present. Twenty microcontroller output pins drive the twenty LED rows, supplying source current to the LEDs causing them to light. The accurate timing of the lighting sequence is achieved by an internal (to the microcontroller) clock generator using an external 3.579545 MHz quartz crystal, X1, as the resonator for the clock oscillator.

The microcontroller, phototransistor, and all LEDs operate from a 5 V (Volt) regulated power source provided by a 5 V regulator IC (Integrated Circuit). The
Light display system requires an unregulated 9 V DC power source. Any commercially available 110 V AC to 9 V DC adapter capable of supplying 1 A (Ampere) of current is adequate for this purpose.

Other Implementations of the Light Display

The light display system can be implemented with various choices of components to accomplish the same effects. The photo-sensor may be replaced with any suitable proximity detector for the purpose of detecting the bottle cap. Incandescent light sources or fluorescent light displays could be substituted for the LEDs with the use of an appropriate driver IC. The microcontroller IC could be replaced with a custom ASIC (Application Specific Integrated Circuit) or with multiple SSI (Small-Scale Integration) ICs to implement the required controlling functions.

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SOURCE CODE DESCRIPTION

```
            list  p="16f72",f=inhx32
            #include <p16f72.inc>

            __CONFIG H'3fa9'

INT_VEC     equ   04h
INT_MASK    equ   61h

Flags       equ   20h
portAreg    equ 21h
portBreg    equ   22h
portCreg    equ   24h
counter_l   equ   26h
counter_h   equ   28h
count_m     equ   29h
mode_flag   equ   2ah
ptr         equ   0x2b
idle_ctr    equ 02ch
idle_ctr_hi equ   0x2d

        org   00h
        goto  Start

        org   INT_VEC
        goto  INT_RTN

;--------------Display pattern data ----------------------;
        org   09h
doogie
        data  001h, 00h, 40h      ;1
        data  02h,  00h,  20h     ;2
        data  04h, 00h, 010h      ;3
        data  08h, 00h, 08h       ;4
        data  020h, 00h, 04h      ;5
        data  00h, 01h, 02h       ;6
        data  00h, 02h, 01h       ;7
        data  00h, 84h, 00h       ;8
        data  00h, 48h, 00h       ;9
        data  00h, 30h, 00h       ;10
        data  00h, 30h, 00h       ;11
        data  00h, 48h, 00h       ;12
        data  00h, 84h, 00h       ;13
        data  00h, 02h, 01h       ;14
        data  00h, 01h, 02h       ;15
        data  020h, 00h, 04h      ;16
        data  08h, 00h, 08h       ;17
        data  04h, 00h, 010h      ;18
        data  02h,  00h,  20h     ;19
        data  001h, 00h, 40h      ;20
        data  00h, 00h, 00h ;Clear
```

```
mod3
        data    01h, 00h, 40h ;1
        data    03h, 00h, 60h         ;2
        data    07h, 00h, 70h;        ;3
        data    0fh, 00h, 78h         ;4
        data    2fh, 00h, 7ch         ;5
        data    2fh, 01h, 7eh         ;6
        data    2fh, 03h, 7fh         ;7
        data    2fh, 87h, 7fh         ;8
        data    2fh, 0dfh, 7fh        ;9
        data    2fh, 0ffh, 7fh        ;10
        data    2fh, 0efh, 7fh        ;11
        data    2fh, 0c7h, 7fh        ;12
        data    2fh, 83h, 7fh         ;13
        data    2fh, 01h, 7eh         ;14
        data    2fh, 00h, 7ch         ;15
        data    0fh, 00h, 78h         ;16
        data    07h, 00h, 70h         ;17
        data    03h, 00h, 60h         ;18
        data    01h, 00h, 40h         ;19
        data    00h, 00h, 00h         ;20
        data    00h, 00h, 00h         ;21  Clear

mod4
        data    01h, 00h, 00h         ;1  1
        data    04h, 00h, 00h         ;2  3
        data    02h, 00h, 00h         ;3  2
        data    08h, 00h, 00h         ;4  4
        data    00h, 01h, 00h         ;5  6
        data   20h, 00h, 00h          ;6  5
        data    00h, 02h, 00h         ;7  7
        data    00h, 08h, 00h         ;8  9
        data    00h, 04h, 00h         ;9  8
        data    00h, 10h, 00h         ;10  10
        data    00h, 40h, 00h         ;11  12
        data    00h, 20h, 00h         ;12  11
        data    00h, 80h, 00h         ;13  13
        data    00h, 00h, 02h         ;14 15
        data    00h, 00h, 01h         ;15  14
        data    00h, 00h, 04h         ;16  16
        data    00h, 00h, 10h         ;17  18
        data    00h, 00h, 08h         ;18  17
        data    00h, 00h, 20h         ;19  19
        data    00h, 00h, 40h         ;20  21
        data    00h, 00h, 00h         ;21  Clear

Start
        Banksel         PORTA
        clrf    Flags
        clrf    portAreg
        clrf    portBreg
```

```
        clrf    portCreg
        clrf    mode_flag
        clrf    ptr
        clrf    idle_ctr
        movlw 10h
        banksel         TRISA
        movwf TRISA                     ;Set RA4 as input

        clrf    TRISB                   ;Set Port B for all outputs
        banksel TRISC
        clrf    TRISC                   ;Config Port C for ouputs [6:0]
        bsf     TRISC,7                         ;Port C pin 7 as input
        banksel         ADCON1                          ;All digital (not using ADC)
        movlw 06h
        movwf ADCON1
        banksel         PORTA
        clrf    PORTA
        clrf    PORTB
        banksel         PORTC
        clrf    PORTC
Initialize
        movlw 30h
        banksel         T1CON
        movwf T1CON
        bcf             T1CON,TMR1ON    ;Turn off Timer 1
        banksel         PIR1
        clrf    PIR1                    ;clear the Timer1 overflow interupt flag
        movlw 0aah
        movwf TMR1H
        clrf    TMR1L                           ;delay the interupt
        clrf    INTCON
        banksel         PIE1
        clrf    PIE1
        bsf     PIE1,TMR1IE             ;enable the Timer1 interupt
        banksel         INTCON
        bsf     INTCON,PEIE
        bsf     INTCON,GIE

        bsf     T1CON,TMR1ON
        bcf     STATUS,C

Sense_loop
        btfsc   PORTA, 4                        ;Sensor trigger
        goto    next
        bsf     Flags,0
        call    delay
next
        btfss   PORTC,7                                 ;mode switch pressed?
        call    mode
        btfsc   Flags,1                                 ;cap in tunnel
        clrf    idle_ctr
```

```
        btfsc   Flags,2                         ;tunnel clear of all caps?
        call    finale                  ;start the finale
        goto    Sense_loop

skip_RA4
        bsf             portAreg,5
        bcf     portAreg,4
        return

ra4_rt
        bsf     portAreg,3
        bcf     portAreg,4
        return

INT_RTN
        banksel         INTCON
        bcf     INTCON, GIE             ;Disable interrupts
        banksel         PIR1
        bcf     PIR1,TMR1IF
        banksel TMR1H
        movlw 00cch
        movwf TMR1H
        movlw 0e0h
        movwf TMR1L
        banksel         PORTA
        incf    idle_ctr,1              ;increment the idle counter
        btfsc   STATUS,Z                ;overflow to hi byte
        incf    idle_ctr_hi,1
        movf    idle_ctr_hi,0
        sublw   07h
        btfss   STATUS,Z
        goto    norm_int
        movf    idle_ctr,0
        sublw   02h
        btfss   STATUS,Z
        goto    norm_int
        call    finale
        retfie
norm_int
        btfsc   Flags,0                 ;Botlle cap crossing sensor
        bsf     Flags,1                 ;Bottle cap in tunnel
        btfsc   Flags,4                 ;Mode 3
        goto    in_tube
        btfsc   Flags,5
        goto    in_tube
        btfsc   Flags,6
        goto    in_tube
        goto    simple
in_tube
        btfss   Flags,1
        retfie
```

```
        btfsc   Flags,4
        goto    m3
        btfsc   Flags,5
        goto    m4
        btfsc   Flags,6
        goto    m5
simple
        call    shift_left
        btfss   Flags,1
        retfie
        goto    tunnel_clear

m3
        btfsc   Flags,0
        clrf    ptr
        movlw   doogie
        call    disp_stepPat
        bcf     Flags,0
        goto    tunnel_clear
m4
        btfsc   Flags,0
        clrf    ptr
        movlw   mod3
        call    disp_stepPat
        bcf     Flags,0
        goto    tunnel_clear
m5
        btfsc   Flags,0
        clrf    ptr
        movlw   mod4
        call    disp_stepPat
        bcf     Flags,0
tunnel_clear                    ;Start finale if tunnel is clear of all caps
        clrw
        iorwf   portAreg,0      ;Check for all zeros in all port registers
        iorwf   portBreg,0
        iorwf   portCreg,0
        btfsc   STATUS,2        ;return if not all zeros (sequence not finished)
        bsf     Flags,2                 ;Finale flag
        retfie

get_tableByte
        banksel PMCON1
        bsf     PMCON1,RD
        nop
        nop
        banksel         PMDATL
        movf    PMDATL,W
        return

disp_stepPat
```

```
        addwf  ptr,0
        banksel        PMADRL
        movwf PMADRL
        clrw
        movwf PMADRH
        banksel        PORTA
        movf   ptr,W                ;advance ptr to next line
        addlw  03h
        movwf ptr
        clrw
        call   get_tableByte
        banksel        PORTA
        movwf portAreg
        banksel        PMADRL
        movf   PMADRL,W
        addlw  01h
        movwf PMADRL
        call   get_tableByte
        banksel        PORTA
        movwf portBreg
        banksel        PMADRL
        movf   PMADRL,W
        addlw  01h
        movwf PMADRL
        call   get_tableByte
        banksel        PORTA
        movwf portCreg
        call   write_port
        return

mode
        banksel        INTCON
        bcf    INTCON, GIE          ;Disable interrupts
        banksel        PORTA
        incf   mode_flag            ;advance to next display mode
        movf   mode_flag,0
        xorlw  05h                          ;back to first mode?
        btfsc  STATUS,Z
        movwf mode_flag             ;reset to mode 0
        movf   mode_flag,0
        sublw  01h
        btfsc  STATUS,Z
        bsf    Flags,3
        movf   mode_flag,0
        sublw  02h
        btfsc  STATUS,Z
        goto   mode2
        movf   mode_flag,0
        sublw  03h
        btfsc  STATUS,Z
        goto   mode3
```

```
        movf    mode_flag,0
        sublw   04h
        btfsc   STATUS,Z
        goto    mode4

simple_modes
        bcf     Flags,6
        movlw   .22
        movwf   count_m
        bsf     Flags,0
loop2
        call    shift_left
        call    sdelay
        decfsz  count_m,f
        goto    loop2
        clrf    idle_ctr
        clrf    idle_ctr_hi
        retfie

mode2
        bsf     Flags,4                 ;mode 2 flag
        bcf     Flags,3
        movlw   .21
        movwf   count_m
loop9
        movlw   doogie
        call    disp_stepPat
        call    sdelay
        decfsz  count_m,f
        goto    loop9
        clrf    ptr
        clrf    idle_ctr
        clrf    idle_ctr_hi
        retfie

mode3
        bsf     Flags,5                 ;mode 3 flag
        bcf     Flags,4                 ;clear mode 2 flag
        movlw   .21
        movwf   count_m
loop10
        movlw   mod3
        call    disp_stepPat
        call    sdelay
        decfsz  count_m,f
        goto    loop10
        clrf    ptr
        clrf    idle_ctr
        clrf    idle_ctr_hi
        retfie
```

```
mode4
        bsf     Flags,6                 ;mode 3 flag
        bcf     Flags,5                 ;clear mode 2 flag
        movlw   .21
        movwf   count_m
loop11
        movlw   mod4
        call    disp_stepPat
        call    sdelay
        decfsz  count_m,f
        goto    loop11
        clrf    ptr
        clrf    idle_ctr
        clrf    idle_ctr_hi
        retfie

shift_left
        banksel         PORTA
        movf    PORTA,0
        bcf             STATUS,C
        rlf             portAreg,1              ;rotate left Flag register
        btfsc   Flags,0
        bsf     portAreg,0

        btfss   Flags,0
        goto    skipit
        btfsc   Flags,3
        bsf     portAreg,1
skipit
        bcf     Flags,0
        bcf     STATUS,C
        rlf     portBreg,1
        rlf     portCreg,1
        btfsc   portCreg,7
        bcf     portCreg,7
        btfsc   portAreg,6
        bsf     portBreg,0
        bcf     portAreg,6
        btfsc   portAreg,4
        call    skip_RA4
        call    write_port
        return

shift_right
        banksel         PORTA
        movf    PORTA,0
        bcf     STATUS,C
        rrf     portCreg,1
        rrf     portBreg,1
        btfsc   STATUS,C
```

```
        bsf     portAreg,6
        bcf     STATUS,C
        rrf     portAreg,1
        btfsc   portAreg,4
        call    ra4_rt
        bsf     portCreg,6
        call    write_port
        return


write_port
        movf    portAreg,w
        movwf   PORTA                           ;update ports
        movf    portBreg,w
        movwf   PORTB
        movf    portCreg,w
        movwf   PORTC
        return


finale
        banksel         INTCON
        bcf             INTCON, GIE             ;Disable interrupts
        movlw   .21
        movwf   count_m
loop3
        call    shift_right
        call    fdelay
        decfsz  count_m,f
        goto    loop3
        banksel         PORTA
        movf    PORTA,0
        clrf    portAreg
        clrf    portBreg
        clrf    portCreg
        call    write_port
        movwf   PORTC
        call    sdelay
        movf    PORTA,0
        movlw   0ffh
        movwf   PORTA                           ;update ports
        movwf   PORTB
        movwf   PORTC
        call    sdelay
        movf    PORTA,0
        clrw
        movwf   PORTA                           ;update ports
        movwf   PORTB
        movwf   PORTC
        bcf     Flags,0
```

```
        bcf     Flags,1
        bcf     Flags,2
        clrf    ptr
        clrf    idle_ctr
        clrf    idle_ctr_hi
        retfie


delay
        movlw 047h
        movwf counter_h
Inner
        movlw 0bfh
        movwf counter_l
Dloop2
        nop
        nop
        nop
        decfsz counter_l,f
        goto    Dloop2
        decfsz counter_h,f
        goto    Inner
        nop
        return

fdelay
        movlw 027h
        movwf counter_h
Inner2
        movlw 0bfh
        movwf counter_l
Dloop5
        nop
        nop
        nop
        decfsz counter_l,f
        goto    Dloop5
        decfsz counter_h,f
        goto    Inner2
        nop
        return

sdelay
        movlw 057h
        movwf counter_h
Inner3
        movlw 0bfh
        movwf counter_l
Dloop6
        nop
        nop
```

```
nop
decfsz counter_l,f
goto   Dloop6
decfsz counter_h,f
goto   Inner3
nop
return
end
```